IMPLICATIONS OF HOUSE BILL 831 A CONSULTANT'S PERSPECTIVE

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What is the intent of HB831?

- Address Trout Unlimited Smith River Supreme Court Decision
- Protect prior appropriators
- Provide methods to allow new ground-water appropriations by providing a means of offsetting projected adverse effects via mitigation and/or aquifer recharge

What it requires?

- Define Potentially Affected Area.
- Quantify Net Depletions on Surface Water
- Determine if Adverse Impacts may arise from the Net Depletions.
- Offset the Adverse Impacts.

What it requires?

- **Potentially Affected Area Definition.**

  "the area or estimated area of ground water that will be affected by a proposed project."

  Generally this implies quantifying the zone of relative hydraulic depression or cone of influence from well(s) pumping.

What it requires?

- **Quantify Net Depletions on Surface Water**

  The net depletion associated with any "potentially affected streams including irrigation ditches, springs, etc."

Net Depletion vs Adverse Impact

- **Determine if the Net Depletion(s) causes an Adverse Impact.**
- In other words, will another more senior appropriator not be able to meet their beneficial use allocation as a result of the proposed action?
- If their allocation is unaffected, they are not adversely impacted, no mitigation or recharge required.
- If their allocation would be adversely affected, then there is an adverse impact then mitigation or recharge required to offset that adverse impact.

Mitigation or Recharge

- Mitigation involves reallocated existing water rights most likely by retiring irrigated agricultural acreage and then leaving water either in a ditch or stream.
- Aquifer recharge generally involves recharging water into the underlying aquifer using methods such as infiltration basins, wells or ponds.

Evaluation Requirements

- Hydrogeologic Evaluation
  - Conceptual setting defined.
  - Pumping test analyses.
  - Demonstration of physical availability
  - Definition of potentially affected area including legal availability
  - Report
- Was required prior to passage of HB 831.

Net Depletion Evaluation The Feasibility

- Quantify impact of well pumping on all potentially affected surface waters.
- May be technically feasible in some cases and infeasible in others.
  - Simple case where no streams or a single stream is involved (more likely feasible).
  - Complex cases with several surface water features (streams, ditches and springs) [unlikely feasible].

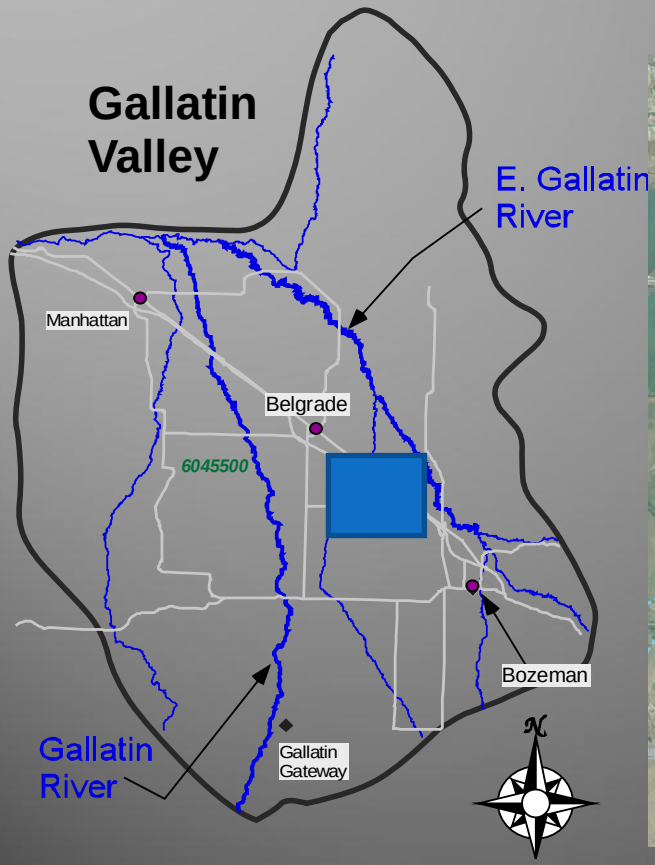
How Realistic is it to Quantify Net Depletion?

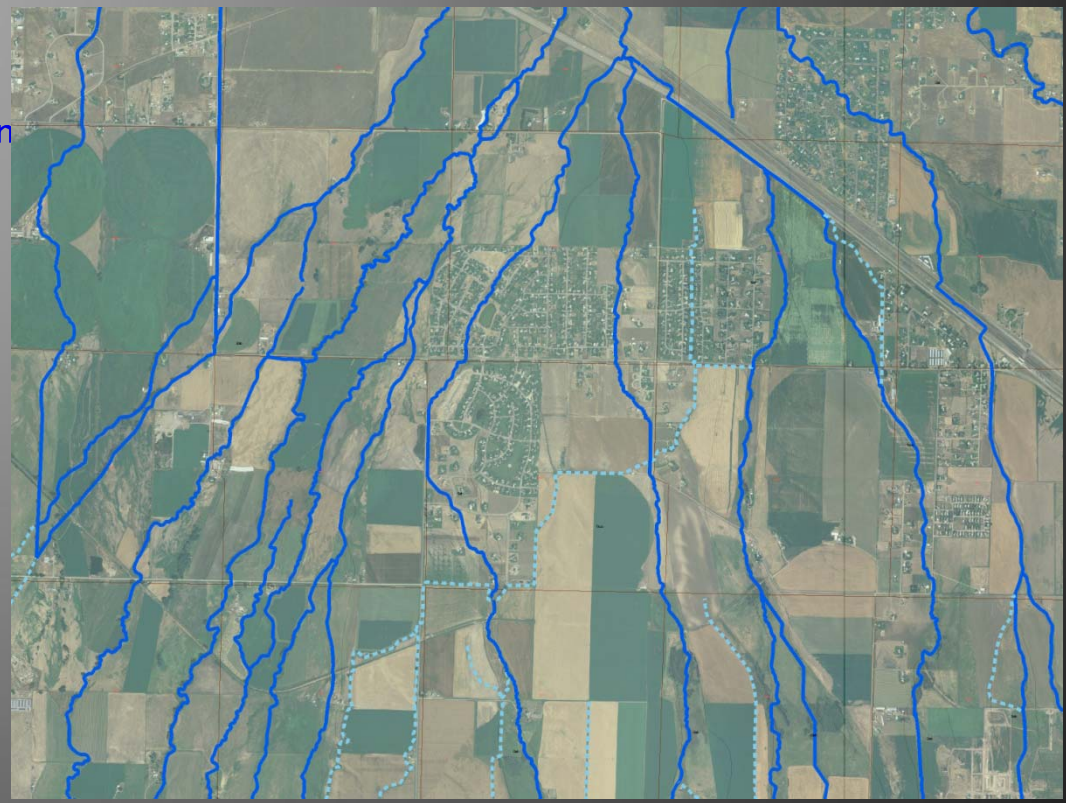
- In simple systems can be done with reasonable reliability.
- In complex systems cannot be done meaningfully for the following reasons:
  - General lack of historical data;
  - General lack of knowledge of stream/ground-water interaction hydraulics;
  - Geologic complexity (and consequently hydraulic property variability), etc.

Complex Conditions

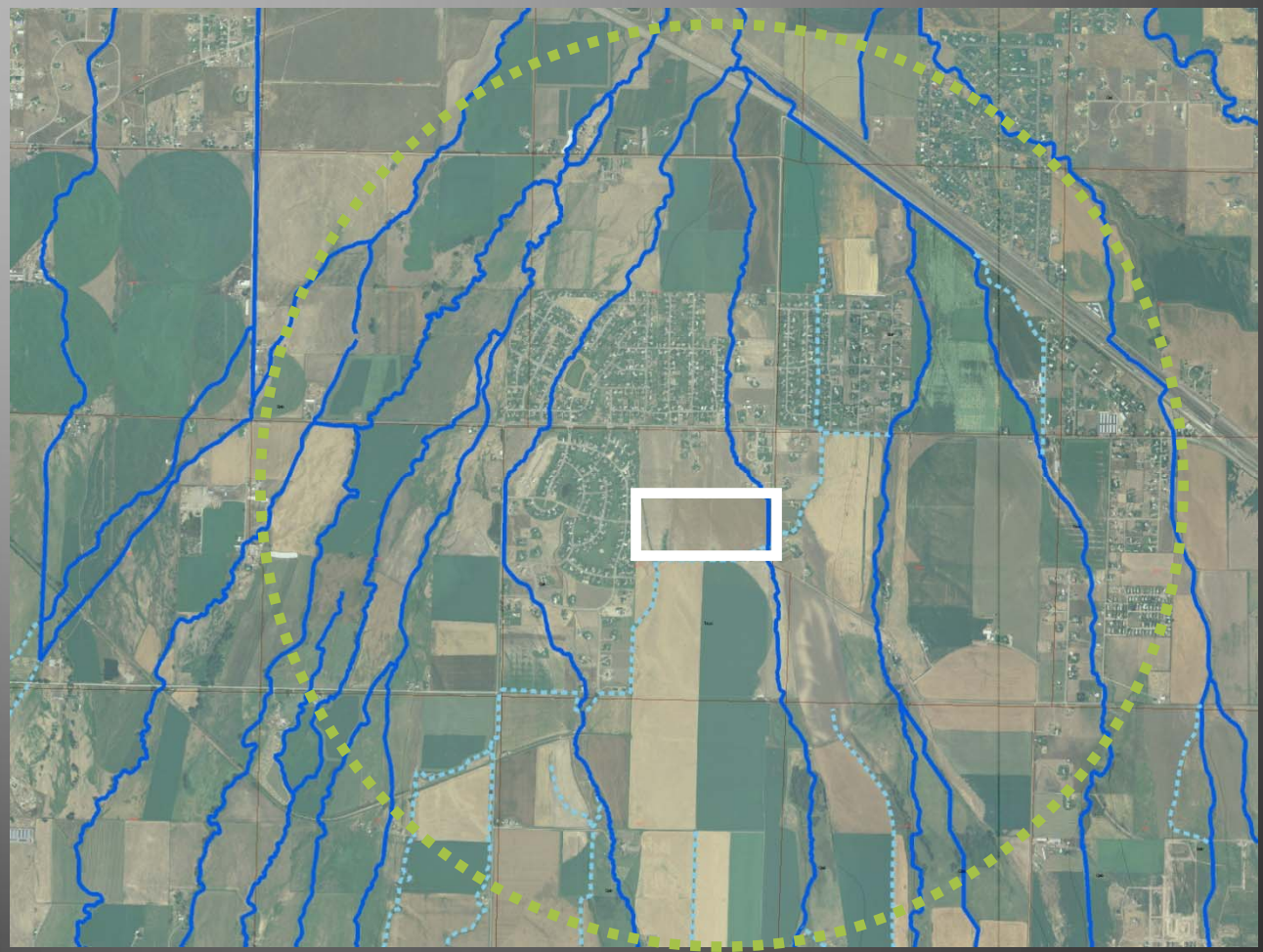
- Multiple surface water features within the potentially affected area.
- Multilayer aquifer systems.
- Aquifer systems showing substantial spatial variability.
- Fracture flow systems.
- Geologic limitations (e.g., shallow strata with low permeability which would impede ability for recharge).
- Aquifer systems where mitigation is infeasible (e.g., no historic surface water use).
- Burden of proof for technical requirements is high in HB831 and probably ***UNattainable in complex condition cases.***

Example of Issues in Assessment

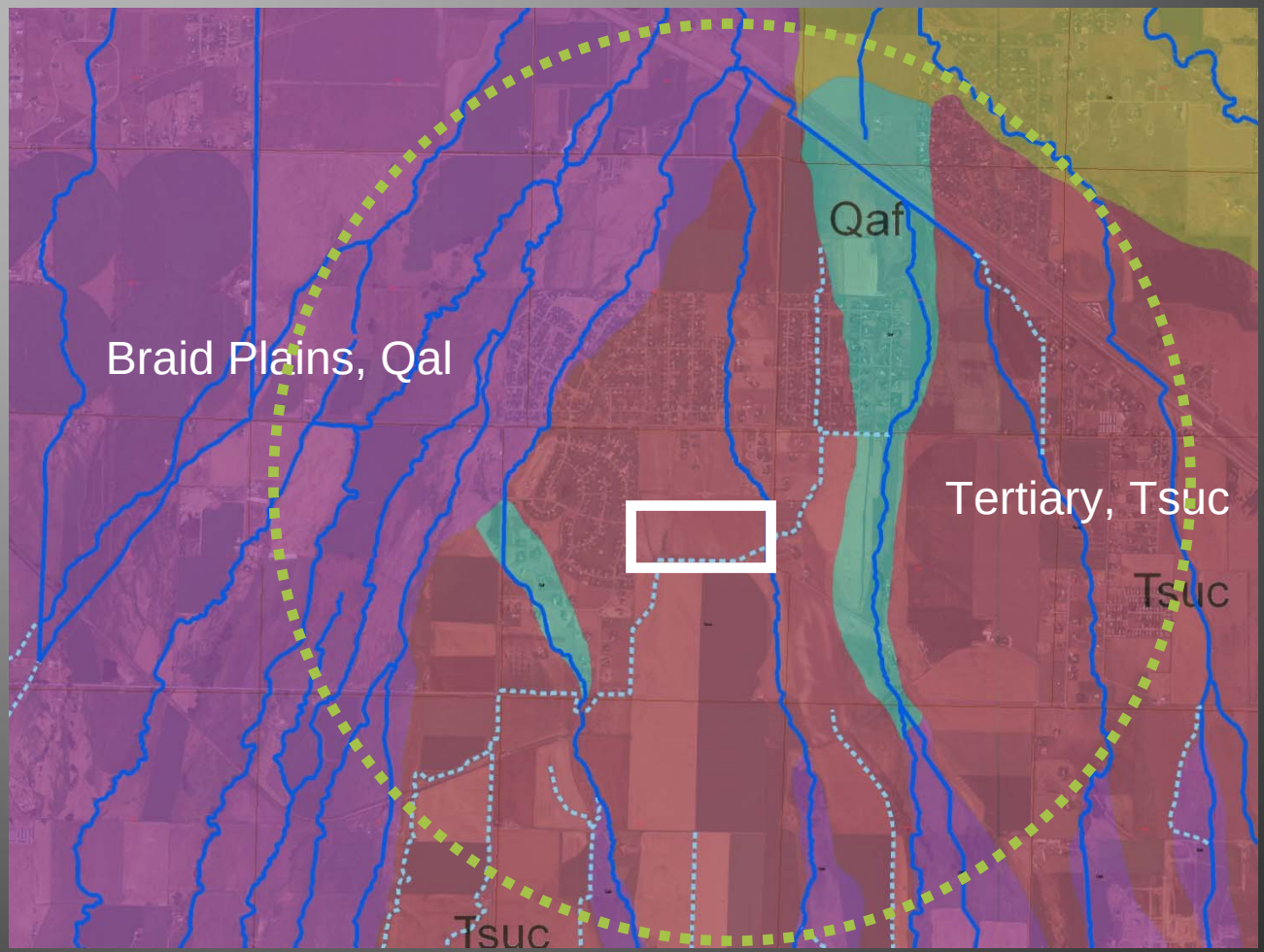




Site Specific Example
Surface Water Features Nearby



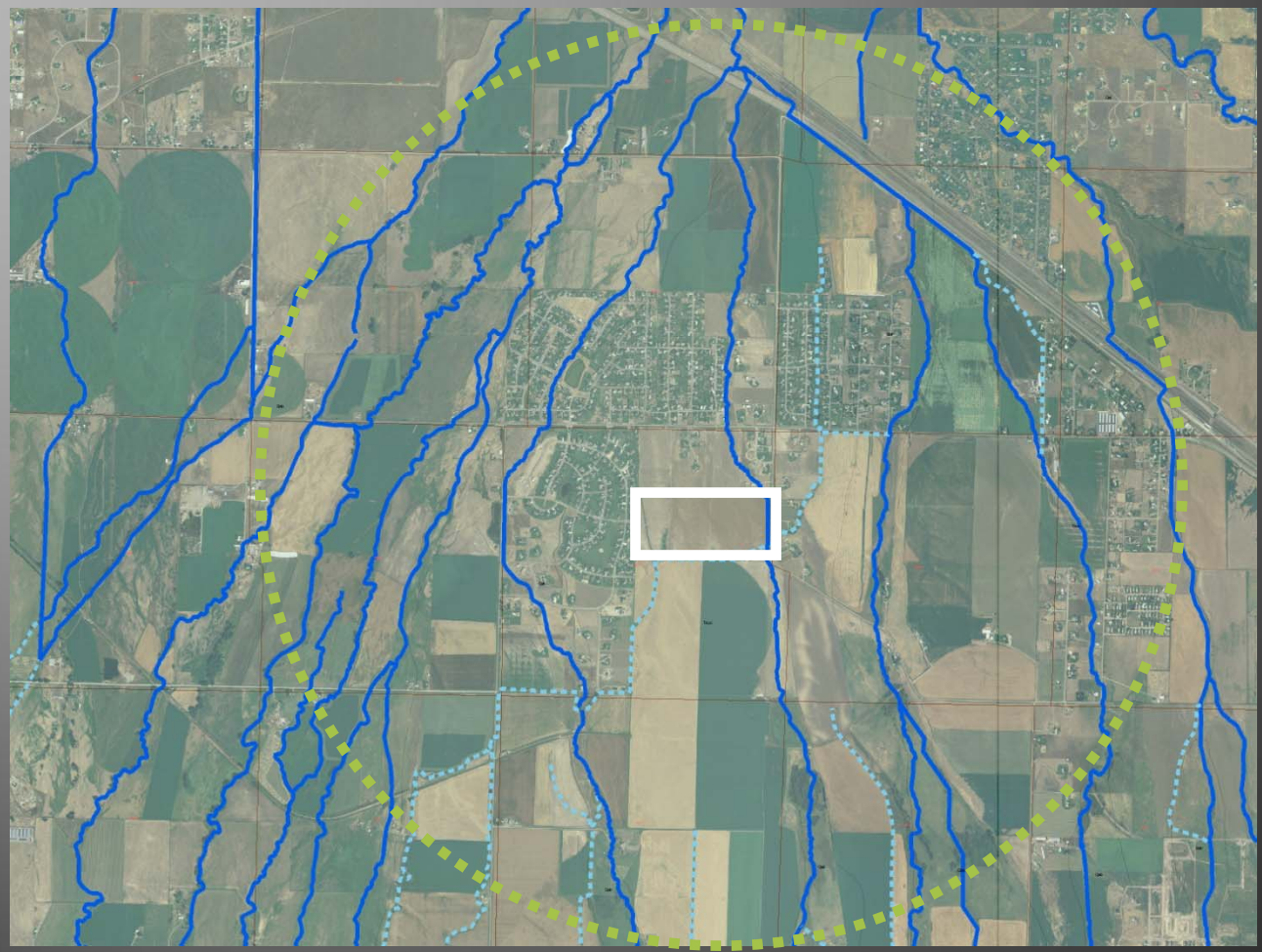
Site Specific Example Geologic Transitions



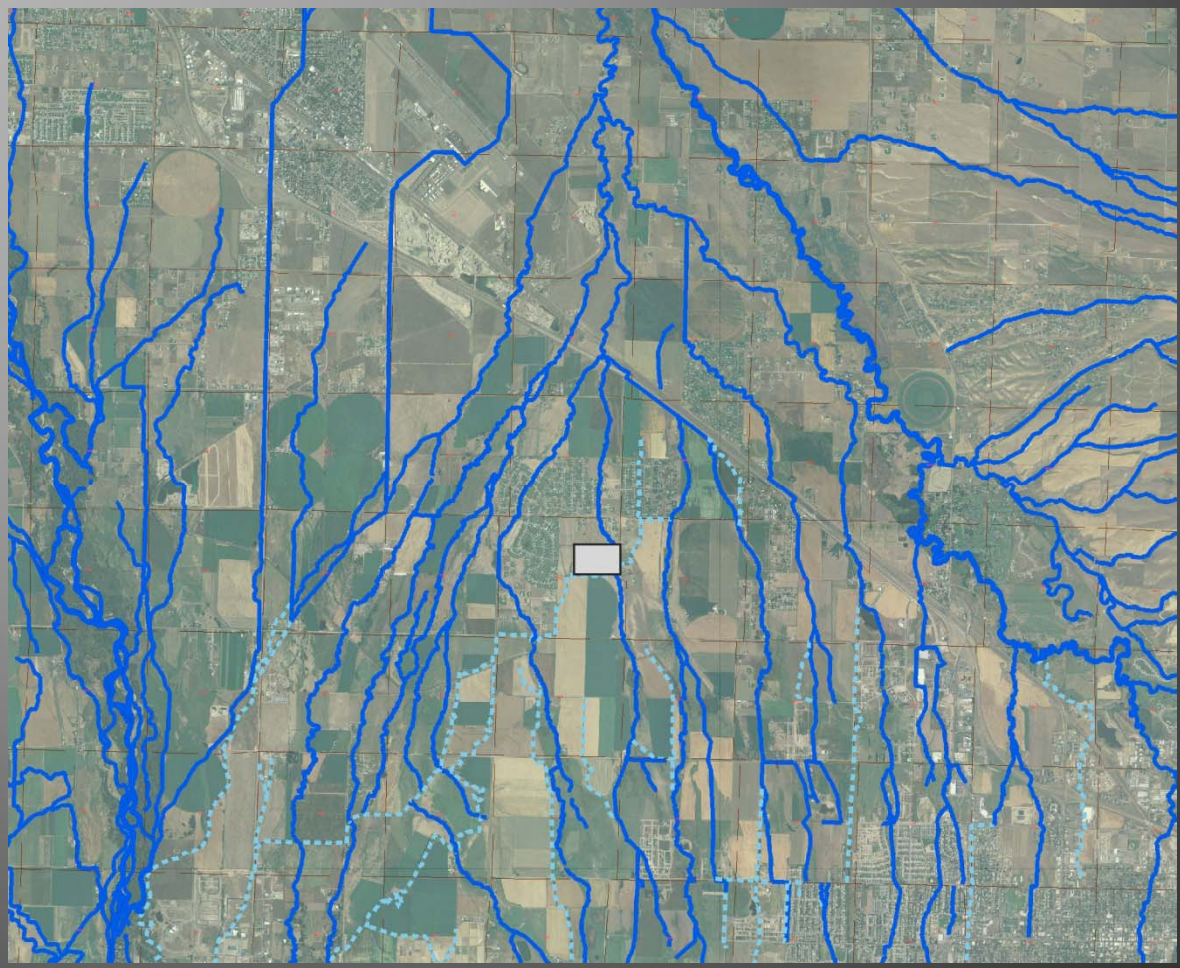
How Do We Address Complex Systems?

- Must simplify analysis.
- Model.
  - Some thoughts on simplification
  - Some thoughts on modeling.
  - Communicate extensively with DNRC technical staff.
- Determine mitigation/recharge methods if adverse impacts are defined.

Potential Simplification



Potential Simplification



Recharge to Offset Adverse Impacts

- Requires a means of measurement and assurance that water is applied.
- Most logical means is an infiltration gallery (akin to a septic drain field).
- Geologic system properties must be favorable to allow sufficient infiltration to occur. Can be problematic in many geologic environments.
- Better at addressing non-irrigation season depletions vs surface water mitigation.
- However, will need to divert stream surface water during the irrigation season.

Offsetting Adverse Impacts

Mitigation – leaving water in streams.

- Requires a means of measurement and assurance that water will actually be used for mitigation purposes.
- Does not address non-irrigation season depletions.
- Surface water may not have been historically used for irrigation purposes at the location where mitigation water is needed. An example where this is especially problematic is the Big Sky resort area of Montana.
- Do we have any flexibility as to where mitigation/ aquifer recharge is performed?

What is/will be Some Consequences of HB831

- Projected to protect senior appropriators.
- Forces development to occur where the surface water irrigation has historically occurred. In effect, this will tend to focus development to the vicinity of streams or alluvial valleys where water is more likely plentiful for mitigation/recharge purposes.
- The process complexity and uncertainty of results will lead to developers attempting to go the exempt well route (a path of least resistance from a water supply perspective).
- Except in very unique situations, it will be nearly impossible to obtain beneficial use permits for agricultural well irrigation.

What is/will be Some Consequences of HB831

- Create a water market economy which may price water out of the reach of most agricultural irrigators. Irrigation water in many instances may have been historically abandoned and the next water user in the appropriation sequence then benefitted.
- The market value of water is becoming an incentive for accelerating transfer of surface water rights from agricultural irrigation which in turn may mean further reductions in agricultural land use (and open space). My recent communications with a water rights attorney indicates this is already occurring at a fairly rapid pace in some areas of Montana. Several of these "entrepreneurs" or investors/water brokers just happened to be one-time ardent "supporters" of HB831 legislation.
- Aside from the above, a treasure trove of new tools for objectors to thwart the beneficial use application process has arisen.

Recommendations

- It is most appropriate to conduct comprehensive watershed water budget evaluations at either a watershed or sub-watershed scale to determine just what the significance of water use is. This could also be performed at a government unit scale (say county or local planning area).
- Simplify the process and make it workable. Define a reasonable "potentially affected area." Relax the 0.01 foot cone-of-depression criterium.
- Also, if mitigation and recharge is going to be the current policy of DNRC no matter what, then why not simplify the analysis requirements? For instance, computations that combine both the demands and recharge augmentation could be made.

Recommendations (continued)

- Consider evaluating the feasibility of basin or sub-basin mitigation/aquifer recharge strategies on a larger scale that can benefit more existing and potential users.

Gallatin Valley Study – Phase II

- One of the basic premises of HB831 (and other preceding proposed bills HB104 and HB138) is that all ground-water development leads to adverse impacts.
- In early 2007 NE&W completed a hydrologic study (water budget evaluation) in order to address the significance of exempt well ground-water use in the Gallatin Valley (Gallatin Valley Study – Phase I, 2007).
- One basic conclusion (amongst others) from the Phase I Study was that the cumulative effects of exempt wells from a water supply perspective is de minimus in terms of stream flow impacts and in terms of ground-water level changes in the Gallatin Valley.
- Note that similar observations to those obtained for the Gallatin Valley are being drawn by the Montana Bureau of Mines and Geology for additional watersheds elsewhere in Montana.

Gallatin Valley Study – Phase II (continued)

- Gallatin Valley Phase II goes further by examining all ground water uses including public water supply, agricultural irrigation and exempt well uses.
- Rigorous analysis of stream flow in the valley is being performed to determine if long-term trends show evidence of "cumulative impacts."
  - This includes evaluating all relevant hydrologic factors affecting stream flows including drought conditions, land-use transitions from subdivision growth, changing agricultural practices, etc., for the full historic period of record.
- Rigorous analysis of ground-water level trend data using procedures set forth by MBMG.
- Valley-wide ground-water model including linear programming for system representation and examining tradeoffs between surface water use and ground-water use.

Gallatin Valley Study – Phase II (continued)

- Will include a separate report section on observations in other watersheds which possess high growth areas. The focus will be to ascertain if the findings of the Gallatin Valley study may be extrapolated to other watersheds.

Some Phase II - Preliminary Conclusions

- No evidence of observable trends (e.g., declines) in the Gallatin River flows over the historic period of record resulting from ground-water development in the valley.
- No evidence of significant ground-water level changes over the historic period of record as a result of ground-water development in the valley.
- Total irrigated acreage has remained relatively constant over time even in the face of urban and rural subdivision growth. There has been an apparent substitution (or tradeoff) between surface water use and ground-water use in some areas of the valley which contributes to this constancy.
- Agricultural commodity growth has increased over time in the valley. This in part is likely related to improved technologies as well as transitions from flood to sprinkler irrigation.

Some Preliminary Conclusions (continued)

- In summary, the obvious conclusion drawn from the study that unless there is an overall substantial and significant change in irrigated acreage in the valley, then it is unlikely that measureable changes will be observed in Gallatin River flows or ground-water levels in association with ground-water development.
- My preliminary assessments of alluvial valley watersheds in other high growth areas, including the Clark Fork Basin, is presently yielding similar conclusions to what we have gleaned for the Gallatin Valley.

Final Thoughts

"Water budgets provide a means for evaluating availability and sustainability of a water supply. A water budget simply states that the rate of change in water stored in an area, such as a watershed, is balanced by the rate at which water flows into and out of the area. An understanding of water budgets and underlying hydrologic processes provides a foundation for effective water-resource and environmental planning and management. Observed changes in water budgets of an area over time can be used to assess the effects of climate variability and human activities on water resources."

[from "Water Budgets: Foundations for Effective Water-Resources and Environmental Management" by R. W. Healy, T.C. Winter, J. W. LeBaugh, and O. Lehn Frank, U.S. Geological Survey Circular 1308, 2007]

Final Thoughts

- Watershed/subwatershed system or jurisdictional level (e.g., County) evaluations should be performed to determine the significance or lack thereof of ground-water development before developing rules and policies. Quite frankly, this should have been done by the State of Montana before developing law such as HB831.

- It is possible that local scale issues can occur. However, it is noteworthy that local scale or project scale evaluations are already required as part of DEQ's subdivision review process. They are also required as part of the beneficial use permitting process of DNRC.